

No. 753,737.

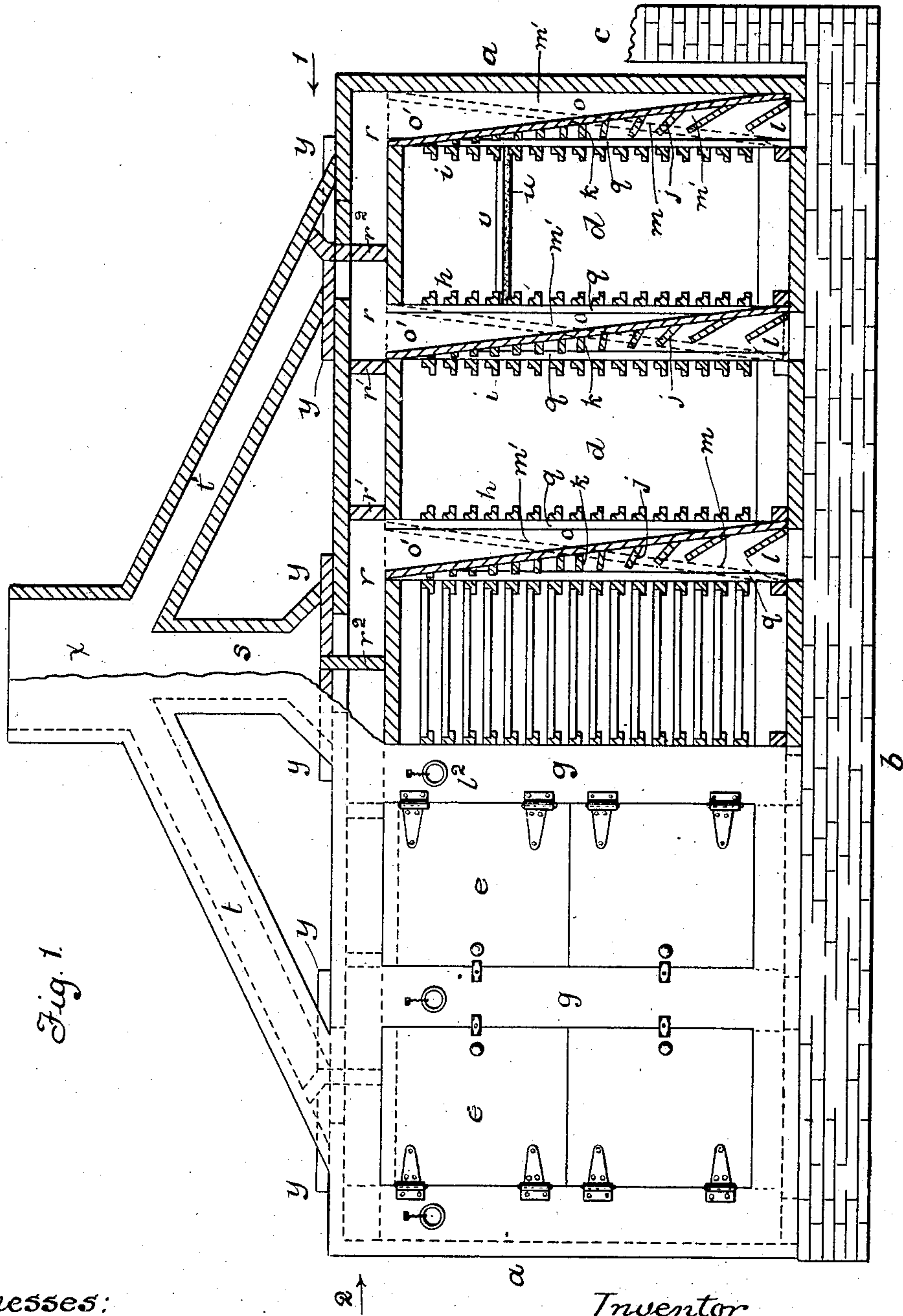
PATENTED MAR. 1, 1904.

A. A. QUARNBERG.
FRUIT DRIER.

APPLICATION FILED MAR. 29, 1901.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses:

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4 SHEETS—SHEET 2.

Fig. 8.

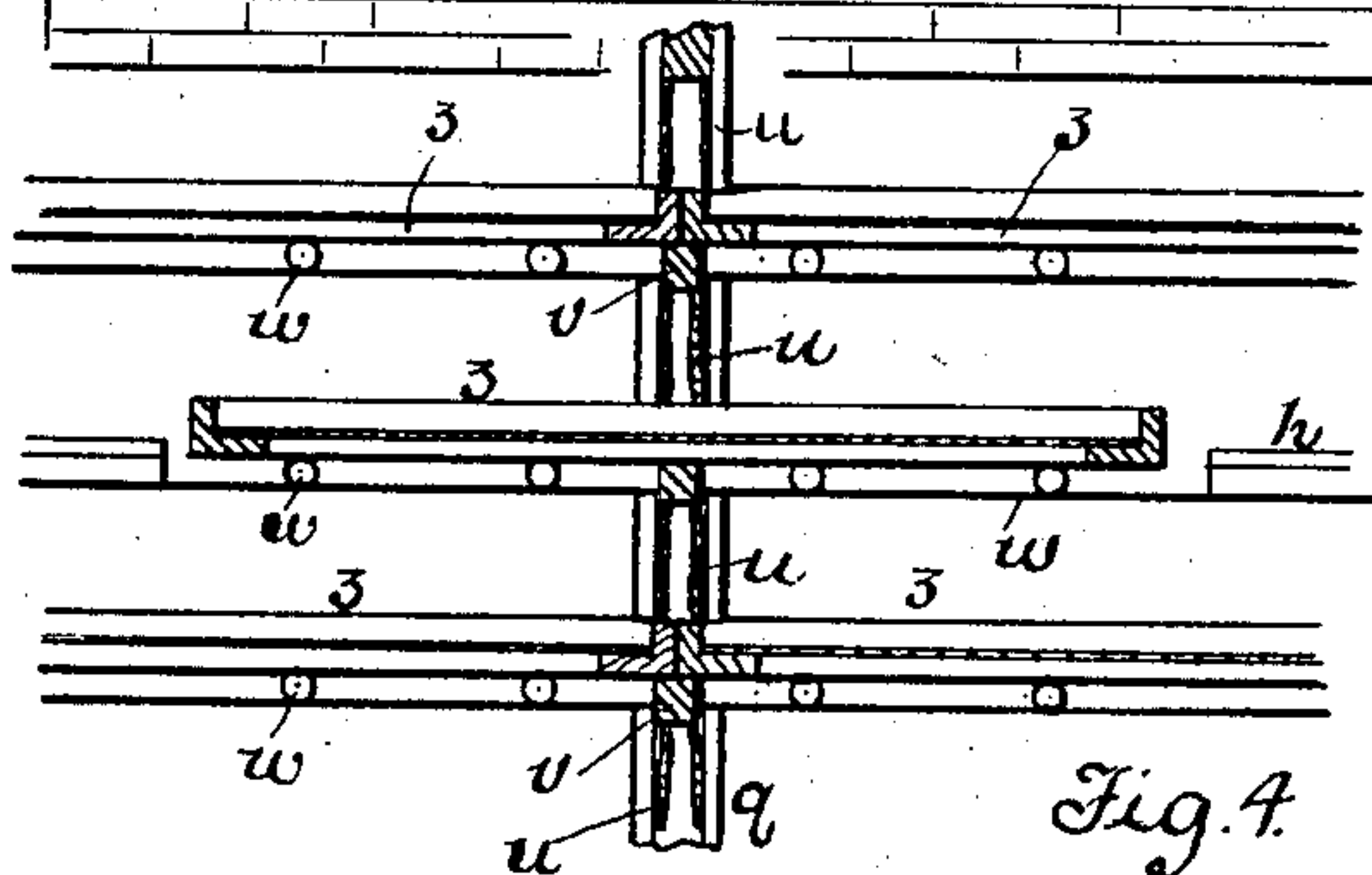
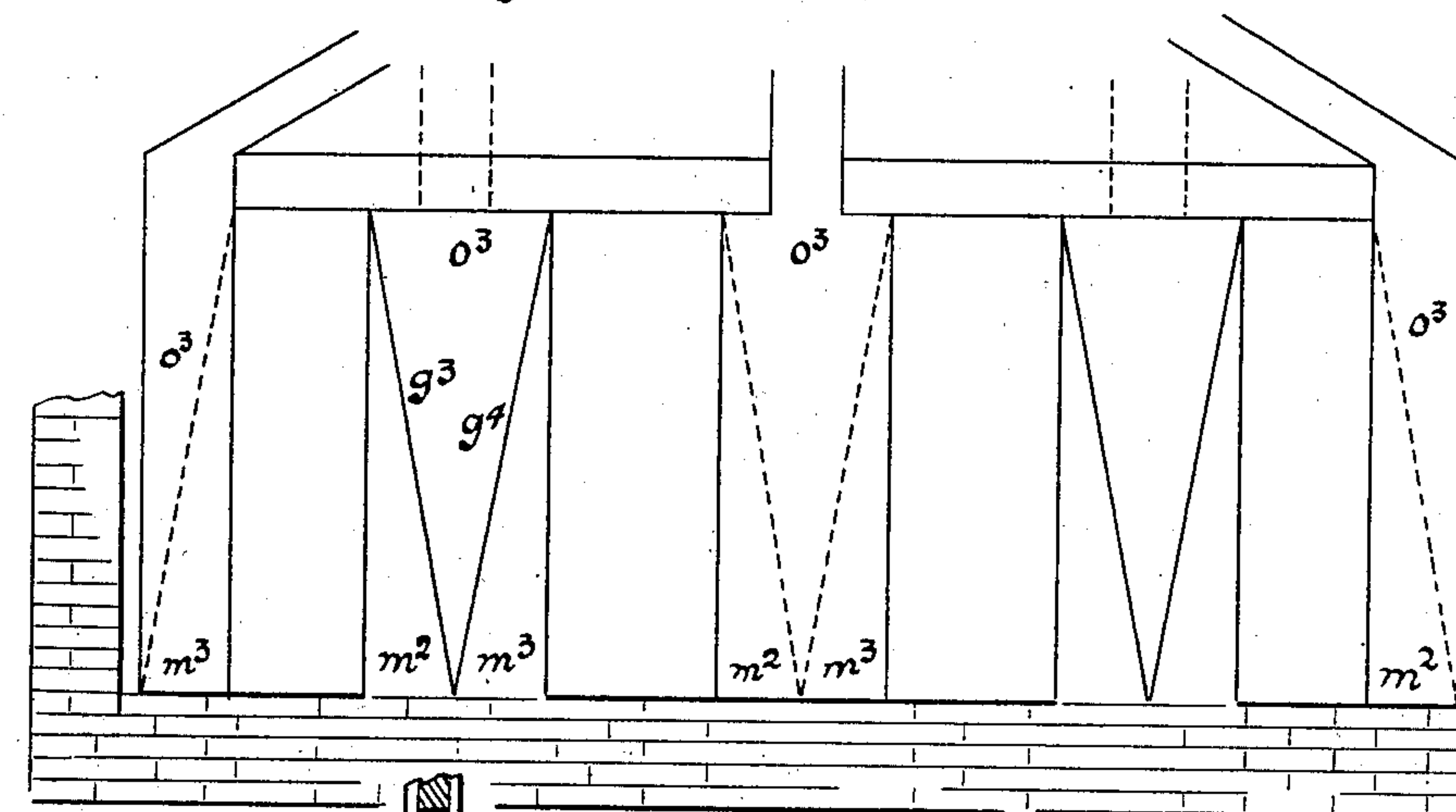


Fig. 4.

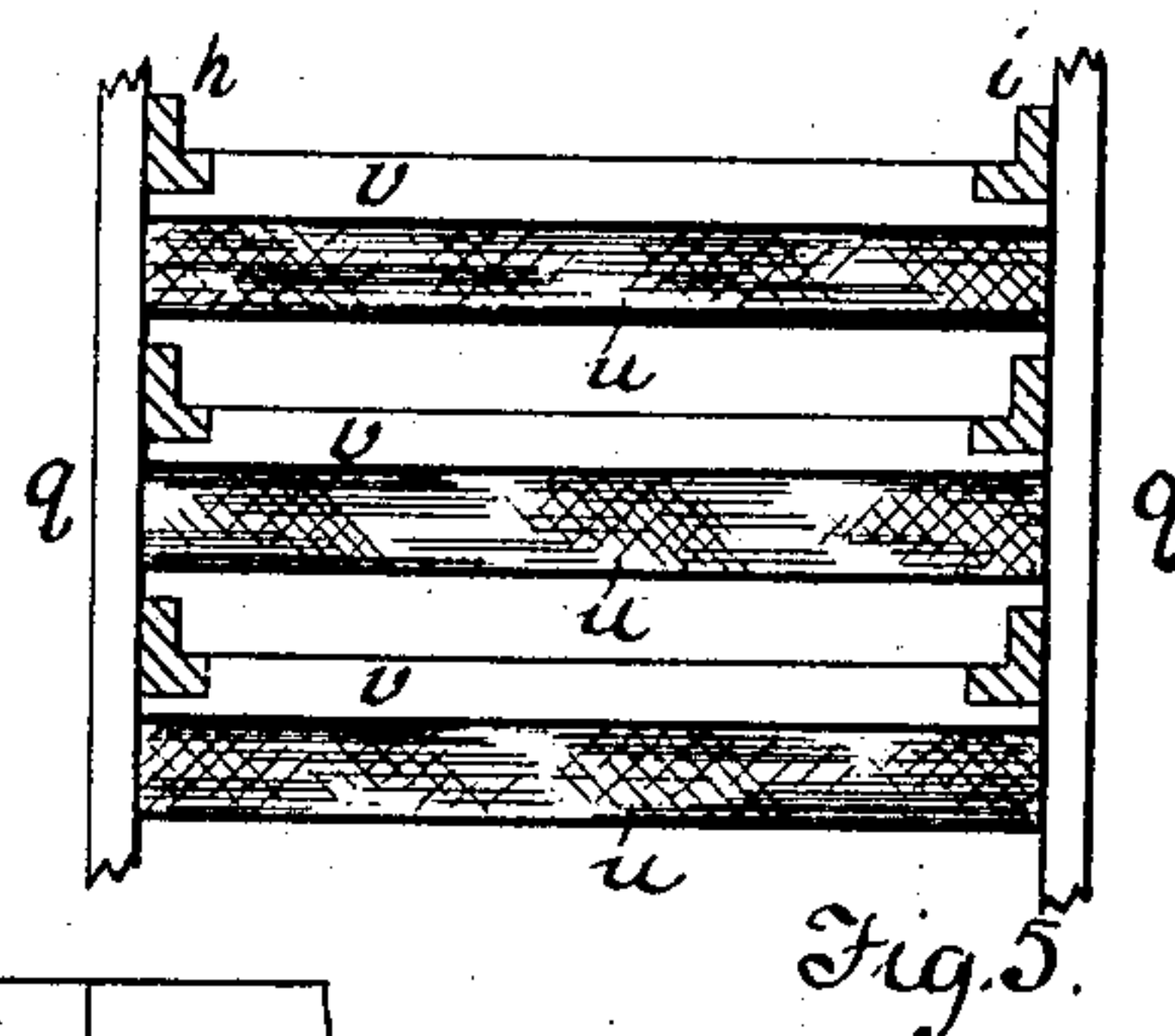


Fig. 5.

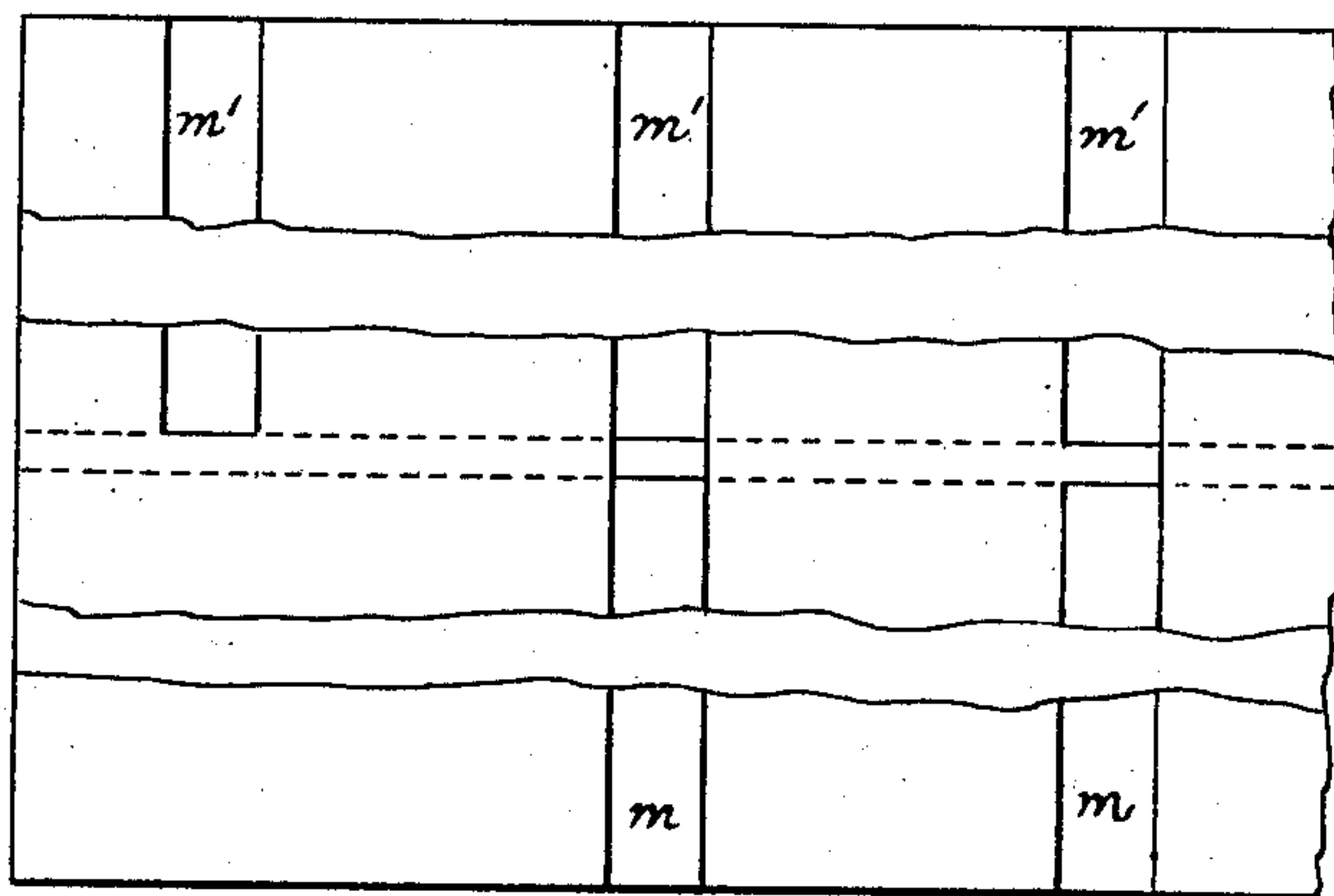


Fig. 2.

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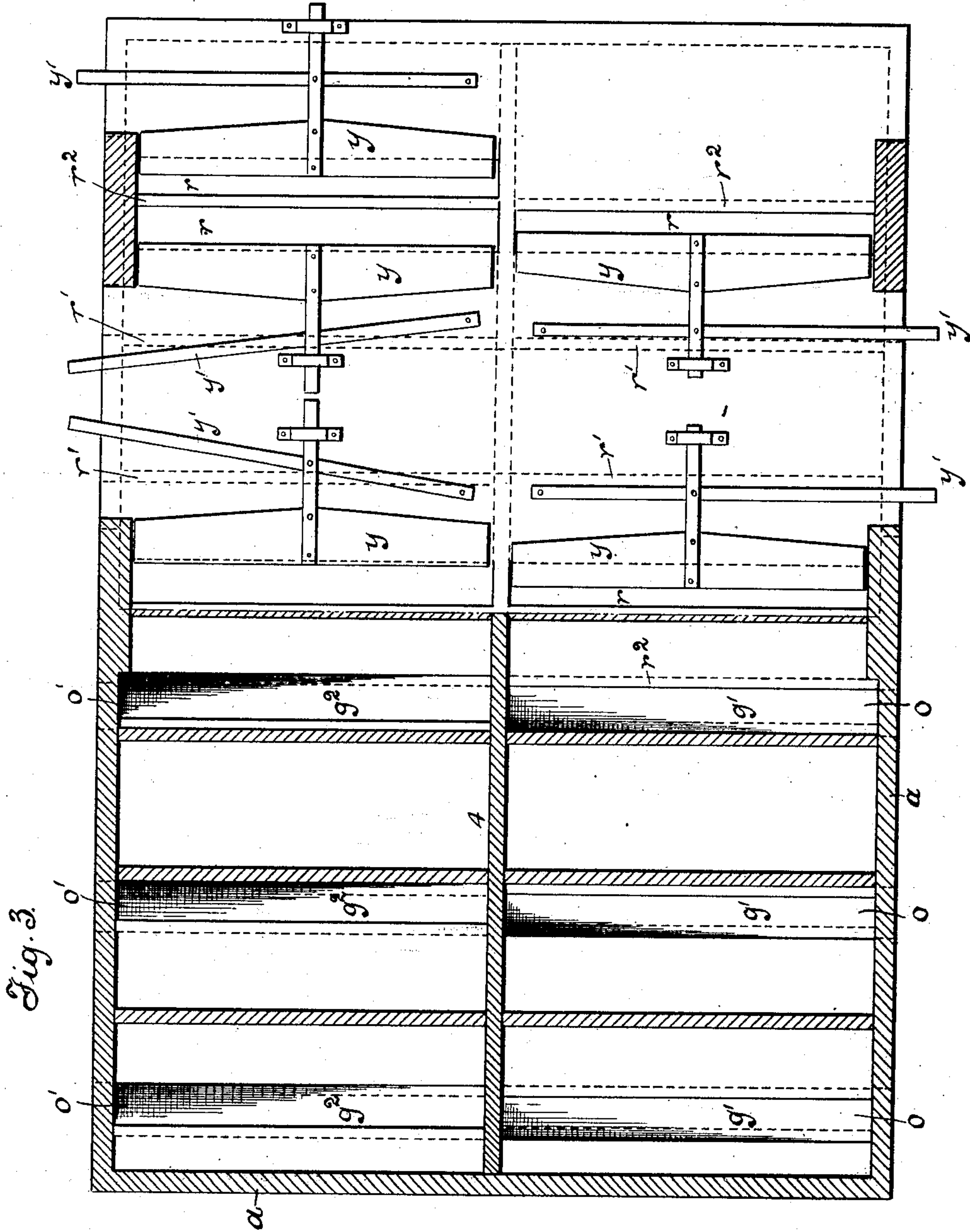
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APPLICATION FILED MAR. 29, 1901.

NO MODEL.

4 SHEETS—SHEET 3.



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No. 753,737.

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FRUIT DRIER.

APPLICATION FILED MAR. 29, 1901.

NO MODEL.

4 SHEETS—SHEET 4.

Fig. 6.

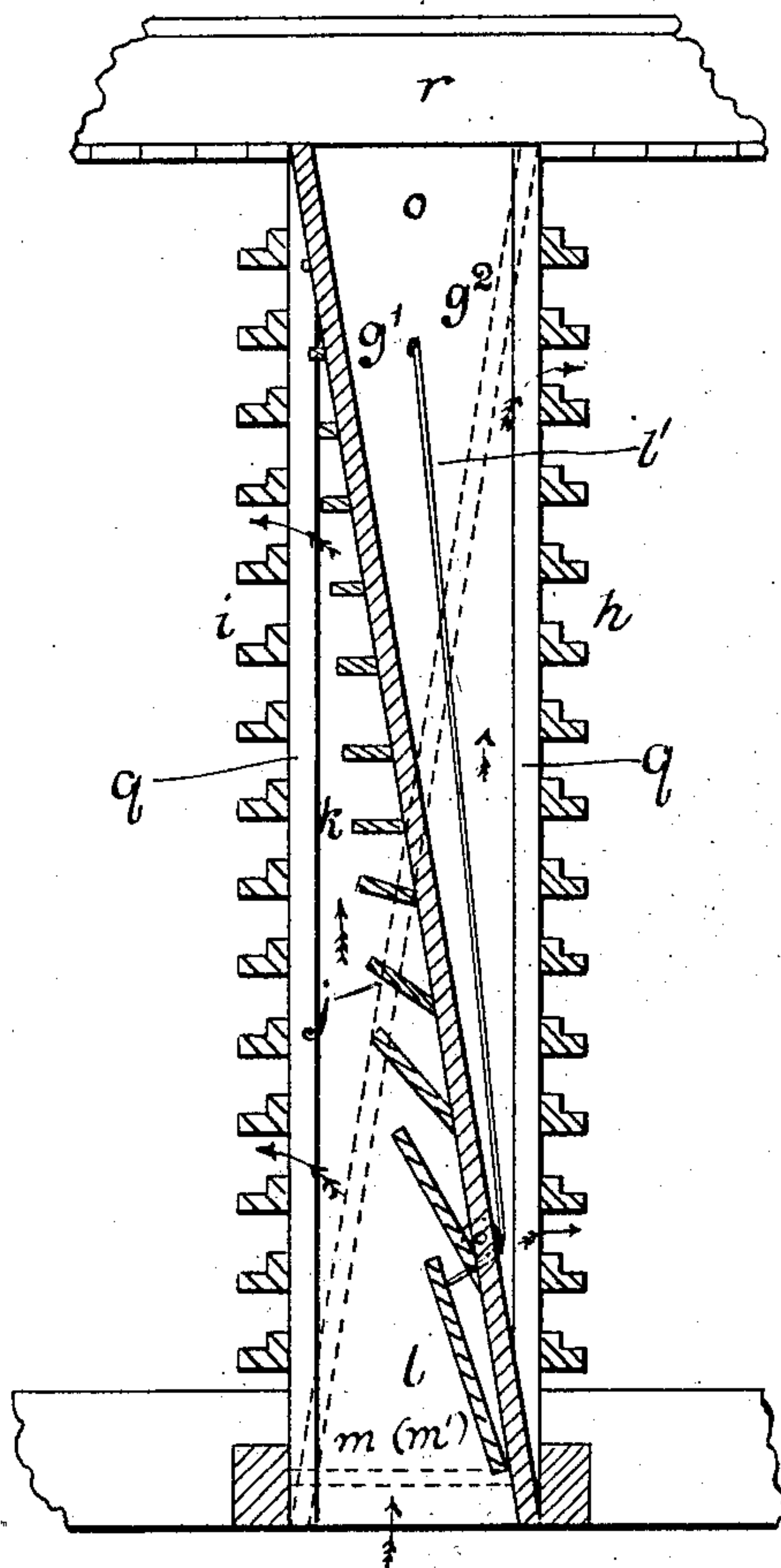
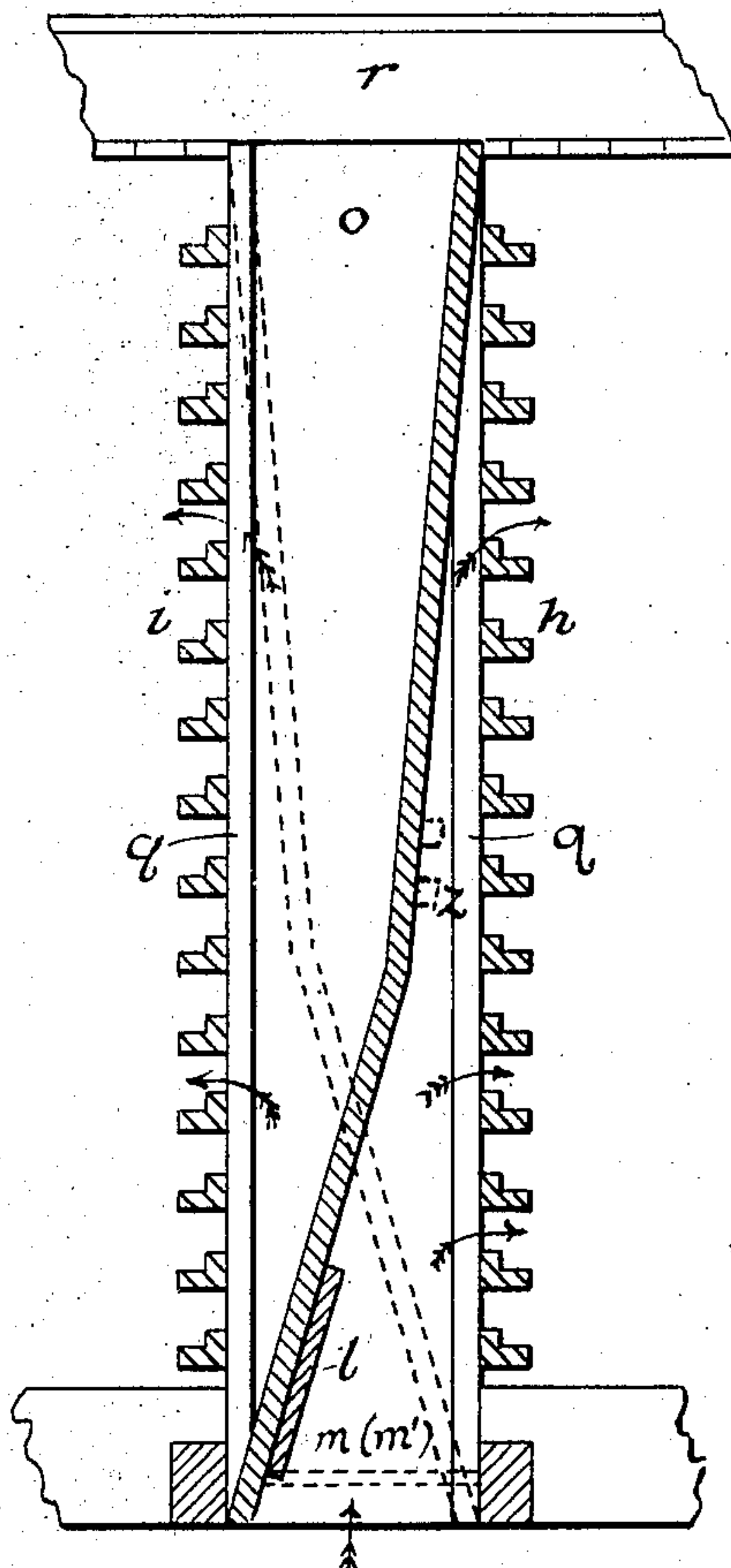


Fig. 7.



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UNITED STATES PATENT OFFICE.

ANDREW A. QUARNBERG, OF VANCOUVER, WASHINGTON.

FRUIT-DRIER.

SPECIFICATION forming part of Letters Patent No. 753,737, dated March 1, 1904.

Application filed March 29, 1901. Serial No. 53,507. (No model.)

To all whom it may concern:

Be it known that I, ANDREW A. QUARNBERG, a citizen of the United States, and a resident of the city of Vancouver, county of Clarke, and State of Washington, have invented certain new and useful Improvements in Fruit-Driers, of which the following is a specification, reference being had to the accompanying drawings as constituting a part thereof.

My invention relates to fruit-driers, and especially to those intended for drying prunes.

One of the essential conditions in drying fruit in a current of hot air is that such current be kept constantly in motion. It was known that to accomplish uniform drying it was best to change the direction of the current of heated air, and such has heretofore been done by turning the fruit-trays. This, however, imposes extra work and watching.

It was therefore my object to construct a drier in which the current of heated air would be guided in one direction for part of the time and then guided in the opposite direction for the remainder of the time during which the fruit was being dried. This would avoid the necessity of turning the fruit-trays and would enable the same to be systematically handled, inserted at one side of the drier, progressively moved through the drier, and withdrawn at the opposite side, the progressive moving of the fruit-trays being accomplished as often as a tray of fruit, the drying of which is completed, would be removed from the further side and replaced by a tray of fresh fruit at the nearer side of the drier.

The construction of my drier and the arrangements of its interior appurtenances are shown in the accompanying drawings, in which—

Figure 1 is an elevation of one of the sides of my drier, the right half thereof having its outer wall removed so that the interior construction may be observed and the outer closure of the upper or roof portion of the drier of such right half being also removed, so as to enable one to follow the courses of the flues through which the hot air escapes after having passed through the drying compartments. Fig. 2 is a partial plan of the

floor of my drier above the heating-chamber. 50

Fig. 3 is a plan section of my drier, taken in the right half of the figure on a line pointed by the arrow 1 and in the left half of the figure on a line pointed by the arrow 2, the dampers *y* and devices for operating same being also shown. Fig. 4 is a partial vertical section taken lengthwise of one of the sides of one of the drying-compartments, showing the arrangements of the slats or rails *h i* through the central portion of the drying-compartments on which the fruit-trays are supported, and particularly the arrangements of friction-rollers *w* used when the tiers carry four or more trays, also of the arrangement and function of the curtains *u*, whereby the drying-compartments are divided into two parts, through each of which the current of hot air is guided in a direction opposite to that of the other, as will be more fully understood from the description of the details hereinafter given. 70

Fig. 5 is a section taken across the central portion of the drying-compartments, showing the cross-pieces *v* from which said curtains are suspended. Figs. 6 and 7 are partial longitudinal sections showing on an enlarged scale the construction of the partitions in the intermediate spaces for deflecting the current of hot air in opposite directions over the drying fruit. The two figures show in detail two different constructions, each of which will hereinafter be more fully explained, and Fig. 8 is a diagrammatic illustration of a modification in the structure and arrangement of the wedge-shaped hot-air induction passages and education passages. 85

The letters designate the parts of my fruit-drier referred to in the description of its construction.

The size of my fruit-drier is immaterial. A convenient arrangement of its parts is represented by the drawings, and by following the general construction so shown it will be an easy matter to build a drier of any desired capacity.

My drier comprises a foundation of masonry *b*, in which the air to be circulated through the drying-compartments is previously heated, for which heating suitable

contrivances are supposed to be provided. The details of construction of these appurtenances of my invention I did not deem necessary to illustrate in the drawings. The gaseous products of the furnace are carried off through a chimney *c*, and sufficient openings are provided for admission of air from the exterior to the heating-chamber. On the heating-chamber is built the superstructure or inclosure *a* of the drier. Such superstructure is divided into a series of rectangular transversely-extending drying-compartments *d*, the ends of which are closed by doors *e*, comprising one, two, or more sections each, as deemed convenient. The skeleton of such superstructure may be built of a floor-frame, on which are placed a series of posts *g*, which may consist of ordinary boards, the edges of which form the corners of the drying-compartments. On such posts are nailed slats or rails *h i* on both sides of the drying-compartment, such rails extending lengthwise along the sides of the drying-compartments and providing the ways or supports for the trays *3*, and also constituting a partial closure for the sides of the drying-compartments, leaving rectangular openings for the admission and exit of the hot-air from and to the induction and eduction passages *m m' o o'*. (Compare Fig. 1, 2, and 3, the reference-letters *m' o'* designating the induction and eduction passages on the farther side throughout the several views.) The bottoms of the drying-compartments are closed. Each opposite pair of slats *h i* should hold either two or four fruit-trays. In any event the number of trays in a tier must be even to conveniently carry out the object in view in the particular construction of my improved drier. Shields *q* are provided extending vertically along the slats *h i* and positioned to cover the abutting inner ends of any contiguous two trays *3*, so as to screen those ends of the trays against a direct current of hot air, experience having shown that there is a tendency for the fruit lying nearest the frame of the trays to dry more rapidly than the rest. The spaces between the drying-compartments are divided by means of a partition *g' g''* into the wedge-shaped induction and eduction hot-air passages *m m'* and *o o'*. As will be observed from the plan view of Fig. 3, the said partitions for one half of the width of the drier lean one way and for the other half lean in the opposite direction, so that the hot air entering the intermediate spaces from the heating-chamber will be guided in one direction through one part of the drying-compartment and in the opposite direction through the other part thereof. By this provision the drying of fruit may be thoroughly and systematically accomplished, and at the same time all avoidable and unnecessary work—such, for example, as turning the trays—is done away

with, for each tray, as progressively moved through the drier, is subjected to hot-air currents coming from one direction for part of the time and hot-air currents coming from the opposite direction for another part of the time during which the fruit is being dried. The progressive moving of the fruit-trays, as already stated, consists in the act of removing a tray of fruit from one side of the drier and replacing the same by a tray of fresh fruit inserted at the opposite side of the drier. To prevent the hot-air current coming from opposite directions in the course of the drying-compartments neutralizing and deflecting each other at the central part of the drying-compartments, I believe it best that such drying-compartments be divided in their central portion by means of curtains *u*, which may be made of any suitable material. The said curtains are adapted not to interfere with the moving of the fruit-trays on their supporting-rails and yet form, with the cross-pieces *v*, from which the curtains are suspended, a sufficient closure for the central part of the drying-compartments to keep the two opposed currents of hot air separated from each other. The separating-curtains, however, are not indispensable. When four or more trays are to be placed in each tier, the same because of their weight may be difficult to move across on the rails *h i*, and for such case I provide in the central portion of the rails *h i* friction-rollers *w*, on which the trays travel while moving through the central part of the drying-compartments.

As appears from the illustrations, Figs. 1, 2, and 3, for the purpose of reducing the number of flues the eduction-passages *o* and *o'* are connected in pairs by means of horizontal air-shafts *r*, vertical air-shaft *s*, and inclined air-shafts *t t'*, all communicating with a common flue *x* in the roof, through which the hot air finally escapes. Partitions *r' r''* divide the horizontal air-flues *r*, so as to connect the eduction-passages *o o'* in pairs. The partitions *r''* are arranged in the center of the flues *s t' t*, and dampers *y* control the escape of the hot air from said eduction-passages through said flues, the dampers having handles operatively connected whereby to place the same, as required. The induction hot-air passages require particular care in construction. The plan of construction of this part of my invention is to make the inlet to such passages as large as possible and then to gradually diminish the air-space upward. The effect of this arrangement is to allow the hot air to enter freely at the base and then driving or forcing the hot air more and more toward the drying-compartments and into the same. The said forcing in of the air can be effected in one of the two ways shown. That shown in Fig. 6 is the preferable way. Here the hot air is crowded in by the projecting deflectors *j k*,

those in the lower part being set at an oblique angle. The deflectors agitate the rising hot-air current and drive the same toward the drying-compartments, the air-current passing
 5 one deflector in its continued ascent, striking against the next upper deflector and being by such means driven progressively between the tiers of trays. In Fig. 7 the partitions are so
 10 arranged as to diminish the induction-passage progressively upward on substantially the same line as the deflectors *j k*. In such case the agitation feature of the rising hot-air current would be omitted, which I, however, prefer to make use of. To also obtain the agitation
 15 feature in a construction shown in Fig. 7, small slats may be affixed to the inclined partition-walls, as indicated by *z*. Such arrangement is not considered by me as effective as the deflectors seen in Fig. 6; but its advantage
 20 is its convenience of construction, the slats *z* being all of equal size. The deflectors *l* are provided in either case, the same serving as dampers when desiring to cut out a particular drying-compartment. For this purpose the
 25 deflectors *l* are made movable, being operated by a cord *l'*, extending to the exterior and provided with a ring *l''*.

In Fig. 8 I have shown a modified structure which may be preferred under certain conditions. The system and mode of procedure in
 30 this case for the handling of the trays would be just the same. The spaces between the drying-compartments are larger, and by means of two partitions *g³ g⁴*, set in V form, the induction-passages *m² m³* are formed between
 35 said compartments, and the intermediate and end spaces *o³* are without any partition and constitute the eduction-passages. The arrangement of the other half of the induction
 40 and eduction passages in this case is just the reverse from that described to produce the effect of reversing the direction of the hot-air current during the drying of the fruit. This construction may be advantageous where the
 45 outer structure of a drying-house already built is to be made use of in reconstructing the interior of the drier in accordance with my improvement.

The flues through which the hot air escapes
 50 from the eduction-passages may also be so arranged in any case as to discharge directly into the air or through inclined intermediate flues, as illustrated in Fig. 8.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a fruit-drier, comprising a lower chamber in which to heat the air to be circulated through the drier, and a superstructure or enclosure built thereon, the combination of a series of parallel drying-compartments, and alternating hot-air induction and eduction passages located between and at the ends of the
 60 courses of drying-compartments, the former communicating with the heating-chamber, and the latter with a flue in the roof of the drier, said induction-passages being constructed to guide the hot air entering from the heating-chamber in opposite directions through the
 65 course of the drying compartments, so that the fruit therein contained will be subjected to a hot-air current coming from one direction for a part of the time, and from another direction, for another part of the time during which it is being dried, substantially as described. 75

2. In a fruit-drier, comprising a lower chamber in which to heat the air to be circulated through the drier, and a superstructure or enclosure built thereon, the combination of a series of parallel drying-compartments, and alternating hot-air induction and eduction passages located between and at the ends of the
 80 courses of drying-compartments, the former communicating with the heating-chamber, and the latter with a flue in the roof of the drier, said induction-passages being adapted to guide the hot air entering from the heating-chamber in varying directions through the course
 85 of the drying-compartments, so that the fruit therein contained will be subjected to a hot-air current coming from one direction for a part of the time, and from another direction for another part of the time, during which it is being dried; and means for keeping the opposite currents of hot air apart without interfering with the moving of the fruit-trays
 90 through the compartments, substantially as described. 95

In testimony whereof I have hereunto affixed my signature, in the presence of two witnesses, this 23d day of March, 1901. 100

ANDREW A. QUARNBERG.

Witnesses:

T. J. GEISLER,
 A. R. CLARK.